Some Medicinal Values of *Telfairia occidentalis*: A Review

A.A.A. Kayode and O.T. Kayode
Biochemistry Unit, Department of Chemical Sciences, Bells University of Technology, Ota, Ogun State, Nigeria

Corresponding Author: A.A. Kayode Abolanle, Biochemistry Unit, Department of Chemical Sciences, Bells University of Technology, Ota, Ogun State, Nigeria Tel: +23408038272670

ABSTRACT

Several medicinal uses of the fluted pumpkin (*Telfairia occidentalis*) in traditional medicine have been documented. Although, many of these claims are yet to be validated by scientific researchers, a review of some investigated therapeutic activities of the plant are highlighted in this article. Experimental works done on *Telfairia occidentalis* especially in the field of Biochemistry were retrieved via Google search on the internet and studied carefully to identify any therapeutic activity reported on *Telfairia occidentalis*. It can be inferred that the ability of the plant to combat certain diseases may be due to its antioxidant and antimicrobial properties and its minerals (especially Iron), vitamins (especially vitamin A and C) and high protein contents. We therefore conclude that with further chemical manipulation and clinical investigations numerous drug designs could emerge from the plant. An effort to keep the plant protected and conserved is also advocated.

Key words: *Telfairia occidentalis*, leaves, seeds, antioxidants, diabetes

INTRODUCTION

Plants provide an alternative strategy in search for new drugs. There is a rich abundance of plants reputed in traditional medicine to possess protective and therapeutic properties. It is likely that plants will continue to be a valuable source of new molecules which may, after possible chemical manipulation, provide new and improved drugs (Shah *et al.*, 2005). Traditional medicinal plants are a therapeutic resource used by the population of the continent specifically for health care, which may also serve as starting materials for drugs (Sowore, 1993). Iwu *et al.* (1999) reported that infectious diseases account for one-half of all deaths in the tropical countries. As a result, people of all continents have long applied poultice and imbibed infusions of indigenous plants dating back to prehistory for health purposes (Cowan, 1999). It comprises of therapeutics practices in existence for hundreds of years before the development of modern scientific medicine and is still in use today without any documented evidence of adverse effects.

According to the World Health Organization (WHO, 1977) a medicinal plant is any plant which in one or more of its organ contains substances that can be used for the synthesis of useful drugs. This definition distinguishes those plants whose therapeutics properties and constituents have been established scientifically and plants that are regarded as medicinal but which have not yet been subjected to thorough investigation. The term herbal drug determines the part/parts of a plant used for preparing medicines (for examples: leaves, flowers, seeds, roots, barks, stems, etc.). Furthermore, WHO (2001) defines medicinal plant as herbal preparations produced by subjecting plant materials
to extraction, fractionation, purification, concentration or other physical or biological processes which may be produced for immediate consumption or as a basis for herbal products.

Medicinal plants contain biologically active chemical substances such as saponins, tannins, essential oils, flavonoids, alkaloids and other chemical compounds (Harborne, 1973; Sofowora, 1996) which have curative properties. These complex chemical substances of different compositions are found as secondary plant metabolites in one or more of these plants. Tyler (1999) has reported that plants also contain certain other compounds that moderate the effects of the active ingredients.

*Telfairia* is classified in the tribe Joliffeae of the subfamily Cucurbitaceae. It comprises 3 species, of which *Telfairia pedata* (Sm. ex Sims) Hook. (Oyster nut) is much cultivated for its seed oil in East Africa. The names *Telfairia pedata* and oyster nut are often erroneously used for *Telfairia occidentalis*. Cultivars of *Telfairia occidentalis* are distinguished by seed colour; thickness of vine, size of leaf, growing vigour, days to flowering and succulence. In Nigeria the two main cultivars are ugu-ala, characterized by succulent, broad leaves, small black seeds, thick stem and slow growth and ugu-elù which has a high growth rate, large brownish seeds with high viability and thin stem with small leaves. The large succulent leaves of ugu-ala make this cultivar a commercial vegetable in high demand, while the fast emergence and high growth rate of 'ugu-elù' is preferred by farmers because of quick returns. The seed is often polyembryonic, which is useful for multiplication and in breeding (Akoroda, 1990b).

*Telfairia occidentalis* Hook f. commonly called fluted pumpkin occurs in the forest zone of West and Central Africa, most frequently in Benin, Nigeria and Cameroon. It is a popular vegetable all over Nigeria. It is rare in Uganda and absent in the rest of East Africa. It has been suggested that it originated in south-east Nigeria and was distributed by the Igbo, who have cultivated this crop since time immemorial. It is, however, equally possible that fluted pumpkin was originally wild throughout its current range, but that wild plants have been harvested to local extinction and are now replaced by cultivated forms. It has different traditional names; among the Igbo, it is known as Ugu, iroko or aporoko in Yoruba, ubong in Efik, umee in Uwhobo and umeke in Edo (Akoroda, 1990a; Badifu and Ogunsina, 1991). In this article we intend to only discuss the therapeutic potentials of *Telfairia occidentalis* which by far outweighs the little possible toxicity in biological systems that has been reported.

GENERAL HEALTH BENEFITS DERIVED FROM *TELFAIRIA OCCIDENTALIS*

*Telfairia occidentalis* is an important staple vegetable grown in Nigeria. The plant produces luxuriant edible green leaves, which are rich in iron and vitamins. Stems of the plants have branching, long twisting tendrils and the leaves are divided into three to five leaflets with the terminal leaflets up to 15 cm long, while the male plant is grown principally for leaves and seeds, which are important soup condiment. Recent studies have shown that *Telfairia occidentalis* leaf is rich in minerals (such as iron, potassium, sodium, phosphorus, calcium and magnesium), antioxidants, vitamins (such as thiamine, riboflavin, niacinamide and ascorbic acid, phytochemicals such as phenols. Harvesting of fluted pumpkin takes place 120-150 days after sowing (Longe et al., 1983; Okoli and Nyanayo, 1988; Akoroda et al., 1990; Ledeji et al., 1995; Oboh and Akindahunsi, 2004; Horsfall and Spiff, 2005; Oboh, 2005; Fasuyi, 2005; Oboh et al., 2005; Ajibade et al., 2006; Kayode et al., 2009). The leaves contain essential oils, vitamins; root contains cucurbitacin, sesquiterpene, lactones (Iwu, 1983). The young leaves sliced and mixed with coconut water and salt are stored in a bottle and used for the treatment of convulsion in ethno medicine (Gbile, 1986). The leaf extract is useful in the management of cholesterol, liver problems and
The seeds are highly nutritious and are roasted or boiled and eaten like the seeds of breadfruit (Treculia); they are also sometimes used as soup thickeners (Okoli and Mgbeogu, 1983). The seed is very rich in oil, especially unsaturated fatty acids which form 61% of the oil (Odumena and Onyeneke, 1998; Okoli and Nyanayo, 1988). Akubue et al. (1980) and Taylor et al. (1983) have documented that fluted pumpkin seeds are a good source of four minerals required in human nutrition. There report showed that the seed contained 29% oil and 30% protein. Asiegbe (1987) reported fluted pumpkin seed contain 47% oil and 31% protein. The protein was said to be markedly deficient in the sulphur amino acid. Longe et al. (1983) reported that fluted pumpkins seeds had 53% fat, 22% protein, 3% fibre, 15% carbohydrates and 2% ash. Oyolu (1980) observed that vegetables will continue to remain the primary source of proteins, minerals and vitamins in African countries, he noted that leaves and edible shoots of fluted pumpkin together contain 85% moisture, while the dry portion of what is usually consumed contains 11% crude protein, 25% carbohydrate, 3% oil, 11% ash and as much as 700 ppm iron. The results of the study carried out by Christian (2007) shows that the seed contained essential nutrients in significant amount that can supplement other foods. The levels of crude protein (3.47%), crude fat (31.38%), moisture (10.58), Ash (2.02%), carbohydrate (50.08%), fibre (2.12%), calcium (280 µg g⁻¹), phosphorus (2100 µg g⁻¹), iron (69 µg g⁻¹), potassium (1280 µg g⁻¹), vitamin A (890 IU) and vitamin C (0.7 µg g⁻¹) detected in the seed were compared with nutritional composition of some plant foods in Nigeria. The study shows that the seed of Telfairia occidentalis Hook F. is high in carbohydrate, fat and phosphorus. The seed also contained levels of vitamin A which can supplement other dietary sources. The oil of Telfairia occidentalis seeds have a high iodine values compared to palm oil which indicates that the oil has a high content of unsaturated fatty acids relative to palm oil. This suggests that it may be used as edible oil for cooking or manufacturing of margarine (Christian, 2007).

The high protein content in leaves of plants such as Telfairia occidentalis could have supplementary effect for the daily protein requirement of the body. The symptoms of protein energy malnutrition such as Kwashiorkor and Marasmus were rarely observed among dwellers in region where adequate amount of protein is obtained from fruits/seeds and leaves of plants rich in proteins such as T. occidentalis (Dike, 2010; Kayode et al., 2010; Kayode et al., 2009).

Pasuyi and Nonyerem (2007) investigations shows that Telfairia occidentalis leaf meal caused increased growth in birds. Adaramoye et al. (2007) reported that Telfairia occidentalis leaves has hypolipidemic effect and may be a useful therapy in hypercholesterolemia. This confirms the research work of Esseyin et al. (2005a). The vitamin A content and consumption pattern of some green leafy vegetables (which includes Telfairia occidentalis) among pregnant women in Calabar, Nigeria was investigated by Williams et al. (2009). They observed that Telfairia occidentalis has the highest vitamin A content which is adequate enough to sustain their vitamin A requirement (Williams et al., 2009). The fruits of Telfairia occidentalis have been utilized in the production of
marmalade (Egbekun et al., 1998). The use of Telfairia occidentalis in reproduction and fertility in traditional medicine is gradually becoming a thing of interest in medical science. A study carried out by Nwangwu and his colleague shows that Telfairia occidentalis has the potential to regenerate testicular damage and also increase spermatogenesis (Nwangwa et al., 2007). However, more research work is required to establish this observation.

ANTIOXIDANT AND FREE RADICAL SCAVENGING PROPERTY

Almost all organisms possess antioxidant defense and repair systems that evolved to protect them against oxidative damage; these systems are insufficient to prevent them entirely. However, antioxidant supplements or foods containing antioxidants may be used to help human body reduce oxidative damage (Yang et al., 2002). In recent years, there has been a particular interest in the antioxidant and health benefit of phytochemicals in food and vegetables. This was as a result of their potential effects on human health (Wei and Shio, 2001). Many researchers especially in the field of medical sciences have observed free radical scavenging ability and antioxidant property in Telfairia occidentalis. The darkish green leafy vegetable leaves of Telfairia occidentalis and extracts (such as aqueous and ethanol extracts) from the leaves have been found to suppress or prevent the production of free radical and scavenge already produced free radical, lower lipid peroxidation status and elevates antioxidant enzymes (such as superoxide dismutase and Catalase) both in vitro and in vivo (Oboh et al., 2004, 2006; Nwanna and Oboh, 2007; Adaramoye et al., 2007; Emeka and Obidoa, 2009; Kayode et al., 2009; Kayode et al., 2010). Telfairia occidentalis has also be found to protects and ameliorates oxidative brain and liver damaged induced by malnutrition in rats (Kayode et al., 2009, 2010). Nwanna and Oboh (2007) reported the hepatoprotective property of polyphenol extracts of Telfairia occidentalis leaves on acetaminophen induced liver damaged. Oboh (2005) reported that both aqueous and ethanolic extracts of T. occidentalis leaves protect the liver cells against garlic- induced oxidative damage. However, the aqueous extract is more effective than the ethanolic extracts, which could be attributed to the higher antioxidant activity of the aqueous extracts of T. occidentalis leaves. Hepatoprotective effects of Telfairia occidentalis leaves have been reported by Eseyin et al. (2005b), Emeka and Obidoa (2009) and Kayode et al. (2010). The use of the leaves in folk medicine in Nigeria in the treatment of certain diseases in which the participation of reactive oxygen species have been implicated could be as a result of the antioxidant and free radical scavenging ability.

ANTIPLASMODIAL AND ANTIMICROBIAL PROPERTIES

Malaria is a potentially life-threatening disease in the tropics as it affects over 400 million people yearly and is responsible for the deaths of an estimated 10,000 women of reproductive age and over 1 million infants and young children each year (Barbin, 1989; Mishra et al., 2003). Drug resistance, increases in the production and circulation of fake drugs and high cost of newer and effective drugs have been a major factor affecting the poor populace, thus making their choice of herbal remedies inevitable and economical. A study has shown that the ethanol root extract of T. occidentalis possess antiplasmodial potential. The blood schizontocidal activity of the root extract is comparable to that of chloroquine (Otokon et al., 2007). The ethanolic and aqueous extracts of Telfairia occidentalis have been reported to show inhibitory effect on growth on some of the commonly encountered Enterobacteriaceae in Nigeria, namely Escherichia coli, Pseudomonas aeruginosa, Proteus sp. and Salmonella typhi. However, both extracts did not inhibit the growth of the fungi tested, which are Aspergillus flavus, Aspergillus fumigatum, Penicillium italicum and
Geotrichum albicidum (Oboh et al., 2006). Antibacterial activity of the leaves was also reported by Odoema and Onyeneke (1998) while Oluwole et al. (2003) reported Telfairia occidentalis anti-inflammatory activities. Antibacterial activity of the root extract against Staphylococcus aureus, Streptococcus pyogenes, Shigella dysenteriae and Klebsiella pneumoniae has been reported by Odoema and Essien (1995).

FLUTED PLUMPKIN BOOSTS BLOOD LEVEL AND BEAT DIABETES

In Nigeria, the herbal preparation of the plant has been employed in the treatment of anaemia, chronic fatigue and diabetes (Alada, 2000; Dina et al., 2006; Aderibigbe et al., 1999). Anaemia constitutes a serious health problem in many tropical countries because of the prevalence of malaria and other parasitic infections. In anaemia there is decreased level of circulating haemoglobin, less than 13 g dL\(^{-1}\) in male and 12 g dL\(^{-1}\) in females (Okochi et al., 2003). In the tropics, where malaria is endemic, between 10 to 20% of the population presents less than 10 g dL\(^{-1}\) of Haemoglobin (Diallo et al., 2008). Children are more vulnerable. The leaves are rich in iron and play a key role in the cure of anaemia, they are also noted for lactating properties and are in high demand for nursing mothers (Okoli and Mgboge, 1988).

Type 2 diabetes is associated with increased oxidative stress, which probably results both from excess generation of reactive oxygen species and decreased antioxidant defenses (Baynes, 1991; Tribe and Poston, 1996). In recent years, it has been known that, the most important factor to increase the free radicals production in diabetes is the hyperglycemic status, which can induce damage through overproduction of superoxide radical in the mitochondria (Brownlee, 2001). Superoxide is converted to hydroxyls, which can diffuse through membranes and initiate lipoperoxidation. The oxidation of unsaturated lipids has implications not only for atherosclerosis, but also for stability and integrity of the red cell membranes (Steinberg et al., 1989). Increased levels of lipoperoxidation as evidenced by breakdown products like malondialdehyde have been found in erythrocytes and plasma type 2 diabetic patients. Supplementation with antioxidants is therefore, an attractive potential therapy. Aqueous extracts of Telfairia occidentalis had been reported to reduce blood glucose level and also have antidiabetic effects in glucose induced hyperglycemic and streptozotocin (STZ) induced diabetic mice (Aderibigbe et al., 1999), while it did not alter the glucose levels in normoglycemic mice. Salman et al. (2008) also reported reduced blood glucose level by Telfairia occidentalis leaves in male rats. Hypoglycemic effects have also been reported by many researchers (Aderibigbe et al., 1999; Eseyin et al., 2000, 2005c, 2007; Nwozo et al., 2004).

REFERENCES


35


